

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
26 February 2004 (26.02.2004)

PCT

(10) International Publication Number
WO 2004/016750 A3

(51) International Patent Classification⁷: **A61K 39/395**,
39/40, 39/42, C07K 16/00

(21) International Application Number:
PCT/US2003/025399

(22) International Filing Date: 14 August 2003 (14.08.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/403,266 14 August 2002 (14.08.2002) US

(71) Applicant (for all designated States except US): **MACRO-
GENICS, INC.** [US/US]; 1500 East Gude Drive,
Rockville, MD 20850 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **KOENIG, Scott**
[US/US]; 10901 Ralston Road, Rockville, MD 20852
(US). **VERI, Maria-Concetta** [IT/US]; 7715 Goodfellow
Way, Derwood, MD 20855 (US).

(74) Agents: **WEILD, David, III** et al.; Pennie & Edmonds
LLP, 1155 Avenue of the Americas, New York, NY 10036
(US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,
MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE,
SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ,
VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

(88) Date of publication of the international search report:
17 March 2005

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: **FcγRIIB-SPECIFIC ANTIBODIES AND METHODS OF USE THEREOF**

(57) Abstract: The present invention relates to antibodies or fragments thereof that specifically bind FcγRIIB, particularly human FcγRIIB, with greater affinity than said antibodies or fragments thereof bind FcγRIIA, particularly human FcγRIIA. The invention provides methods of enhancing the therapeutic effect of therapeutic antibodies by administering the antibodies of the invention to enhance the effector function of the therapeutic antibodies. The invention also provides methods of enhancing efficacy of a vaccine composition by administering the antibodies of the invention.

WO 2004/016750 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/25399

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A61K 39/395; 39/40, 39/42; C07K 16/00

US CL : 424/130.1, 135.1, 137.1, 139.1, 155.1; 530/387.1, 387.9, 388.1

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 424/130.1, 135.1, 137.1, 139.1, 155.1; 530/387.1, 387.9, 388.1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DING, L. et al. Inhibition of the function of the FcγRIIB by a monoclonal antibody to thymic shared antigen 1, a Ly-6 family antigen. Immunology. 2001, Vol. 104, pages 28-36, see entire document.	1-35, 50-64, 81-93, 104-107
Y	TRIDANDAPANI, S. et al. Regulated Expression and Inhibitory Function of FcγRIIB in Human Monocytic Cells. J. Biological Chemistry. 2002, Vol. 277, No. 7, pages 5082-5089, see entire document.	1-35, 50-64, 81-93, 104-107
Y	EP 1 006 183 A1 (MAX-PLANCK-GESELLSCHAFT ZUR FORDERUNG) 07 June 2000 (07.06.2000), see entire document, Abstract in particular.	1-35, 50-64, 81-93, 104-107
Y	WO 01/79299 A1 (THE ROCKEFELLER UNIVERSITY) 25 October 2001 (25.10.2001), see entire document, Abstract in particular.	1-35, 50-64, 81-93, 104-107
X,P	WO 03/066095 A2 (VERENIGING VOOR CHRISTELIJK WETENSCHAPPELIJK ONDERWIJS) 14 August 2003 (14.08.2003), see entire document, Abstract in particular.	1-35, 50-64, 81-93, 104-107
X	WO 99/58572 A1 (CAMBRIDGE UNIVERSITY TECHNICAL SERVICES LIMITED) 18 November 1999 (18.11.1999), see entire document, Abstract in particular.	1-35, 50-64, 81-93, 104-107

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T"

later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X"

document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y"

document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"

document member of the same patent family

Date of the actual completion of the international search

08 December 2004 (08.12.2004)

Date of mailing of the international search report

10 DEC 2004

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US

Commissioner for Patents

P.O. Box 1450

Alexandria, Virginia 22313-1450

Facsimile No. (703) 305-3230

Authorized officer

Michael A. Belyavskiy

Telephone No. (571) 272-1600

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/25399

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claim Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
Please See Continuation Sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1-43,50-64,81-93 and 104-107

Remark on Protest

☐
☐

- The additional search fees were accompanied by the applicant's protest.
No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

PCT/US03/25399

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-43, 50-64, 81-93 and 104-107 drawn to an isolated antibody or a fragment thereof, that specifically binds native Fcγ RIIB, monoclonal antibody that specifically binds native Fcγ RIIB, a pharmaceutical composition comprising said antibody, a method of producing said antibody and a method of treating cancer in a patient comprising administering an antibody that specifically binds native Fcγ RIIB.

Group II, claim 44-49, drawn to an isolated nucleic acid encoding a heavy chain or a light chain of antibody that specifically binds native Fcγ RIIB, a vector and a host cell containing said vector.

Group III, claims 65-76, 94-103 drawn to a method of treating an autoimmune disorder, a method of treating or preventing an IgE-mediated allergic disorder, a method for treating B cell malignancy, a method for treating a disease, a method for treating solid tumors comprising administering an antibody or a fragment thereof, that specifically binds native Fcγ RIIB.

Group IV, claim 77 drawn to a method of enhancing an antibody mediated cytotoxic effect in a subject.

Group V, claims 78-79, drawn to a method of diagnosis of an autoimmune disease in a subject.

Group VI, claim 80, drawn to a method of enhancing an immune response to a vaccine composition.

The inventions listed as Groups I-VI do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

The special technical feature of Group I, claims 1-43, 50-64, 81-93 and 104-107 is considered an isolated antibody or a fragment thereof, that specifically binds native Fcγ RIIB, monoclonal antibody that specifically binds native Fcγ RIIB, a pharmaceutical composition comprising said antibody, a method of producing said antibody and a method of treating cancer in a patient comprising administering an antibody that specifically binds native Fcγ RIIB.

The special technical feature of Group II, claim 44-49, is considered an isolated nucleic acid encoding a heavy chain or a light chain of antibody that specifically binds native Fcγ RIIB, a vector and a host cell containing said vector.

The special technical feature of Group III, claims 65-76, 94-103 is considered a method of treating an autoimmune disorder, a method of treating or preventing an IgE-mediated allergic disorder, a method for treating B cell malignancy, a method for treating a disease, a method for treating solid tumors comprising administering an antibody or a fragment thereof, that specifically binds native Fcγ RIIB.

The special technical feature of Group IV, claim 77 is considered a method of enhancing an antibody mediated cytotoxic effect in a subject.

The special technical feature of Group V, claims 78-79, is considered a method of diagnosis of an autoimmune disease in a subject.

The special technical feature of Group VI, claim 80, is considered a method of enhancing an immune response to a vaccine composition.

Accordingly, Groups I-VI are not so linked by the same or a corresponding special technical feature within meaning of PCT Rule 13.2 so as to form a single inventive concept.

INTERNATIONAL SEARCH REPORT

PCT/US03/25399

Continuation of B. FIELDS SEARCHED Item 3:

BIOSIS, CAPLUS, SCISEARCH, MEDLINE, EMBASE, WEST, USPATFULL, PCTFULL
Search terms: Koenig,S; Concetta,M Fcgamma RIIB, antibody FcgammaRIIA, conjugate

THIS PAGE BLANK (USPTO)